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IC Manufacturing

Intel vs. TSMC: The Transistor Density Debate

Competition between TSMC and foundry newcomers such as Intel and Samsung is a key debate for investors. Intel recently showed on a chart that its 14nm is significantly better than TSMC's 16nm, then TSMC stated that the gap is much closer than Intel claimed. Who's right?

On 16nm, we side more with TSMC: We believe Intel's chart compared its 14nm to TSMC's original 16nm, but since then, TSMC has introduced 16FinFET Plus, which offers an improvement in density. We think it's likely that TSMC's chart compares the latest from both companies, while Intel's is based on the original 16nm node.

…but Intel still has advantages: We note that 16FinFET Plus is only an improvement in transistors, but the metal wiring (back-end) is the same as the original 16nm node. For customers that care about the wiring, Intel likely still has an advantage. For customers that care about transistors, then TSMC and Intel are likely comparable. Since we believe mobile devices are more sensitive to transistors, we tend to side more with TSMC.

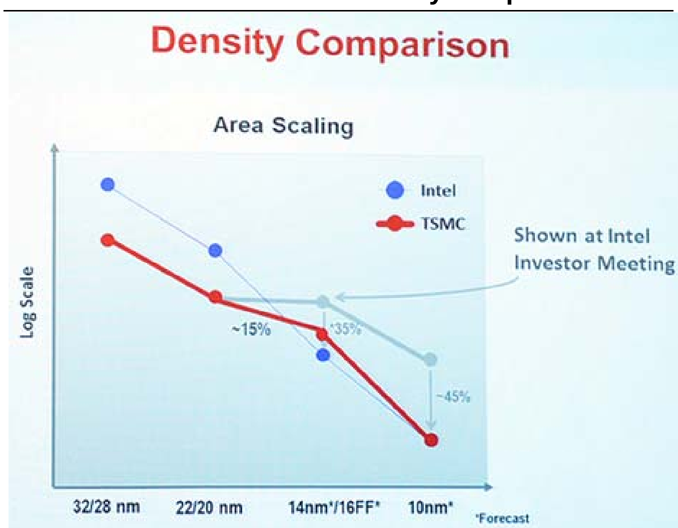
…and 16nm ramp could be slightly later than investors expect: With TSMC now pushing 16FinFET Plus instead of its original 16nm FinFET, we wonder how many customers will wait for the "Plus" version before converting. Though we agree that by going to the "Plus" technology TSMC closed the density gap with Intel, it could imply that revenue ramp for TSMC is pushed out by a quarter or two.

10nm – too early to say: Though we mostly agree with TSMC on its 16nm claims, we view it as too early to make the call on who has the better 10nm node. Recent comments from TSMC management make it clear that 10nm decisions such as EUV are not fully made yet; without the process being locked down, any claims on process superiority are likely more theoretical currently..

The Brewing Foundry Competition

TSMC and Intel – claim and counterclaim: Semiconductor investors are focused on the brewing competition between TSMC and foundry newcomers such as Intel and Samsung. The debate recently heated up when Intel claimed on November 21, 2013 that its 14nm transistor density was 35% ahead of TSMC's 16nm node, and that its 10nm node has density that is 45% better than TSMC's 10nm. On January 16, 2014, TSMC countered with a revised chart which claims that the gap between its 16nm and Intel's 14nm is significantly smaller than 35%, and at 10nm, Intel and TSMC will have the same density. See Exhibit 1 for the analysis from both Intel and TSMC.

Exhibit 1
TSMC vs. Intel's transistor density comparison



Source: Intel, TSMC

The fight for foundry business is not just on transistor density. As we've pointed out in previous reports (listed below), cost, customer relationships, process flexibility, IP library, etc. all play a part. These are areas where TSMC has advantages over Intel. However, on the density claims specifically, if Intel does have a density/performance advantage, it would attract certain customers. Thus this does represent an important variable.

- We believe there's some truth to both sides of the story, but the reality is probably closer to TSMC's in the case of 16nm vs. 14nm.
- For 10nm, our view is it's too early to call.
- Overall, we believe the case for a fabless customer to move from TSMC to Intel at 14nm is not that strong…
- …but at 10nm, given the uncertainties around EUV and the uncertainties on device density, Intel could make a bigger impact in the foundry market if TSMC has execution issues.

What it means for the stocks

Intel: We think that Intel has an interesting opportunity to turn its technology leadership into a viable foundry business, but don't expect it to move the needle on earnings in the next several years. This business will require building a set of capabilities that are new to the company, and different priorities in terms of costs and process flexibility. From first engagement to finalizing a deal is likely a two- to three-quarter process, and from that point it would likely take two years to get to production. Leadership in transistor density can offset Intel's high wafer costs, but if TSMC's FINFET plus initiative can narrow the gap in transistor density, that increases Intel's challenges somewhat.

TSMC: We believe the threat of Intel at 14nm is likely overstated. Besides Altera, we do not see other large customers moving a significant amount of wafers to Intel because the timing and performance gaps are not that large. However, TSMC is rolling out a new version of 16nm called 16FinFET Plus, so we do think that Wall Street expectations for 16nm revenue ramp could be a bit too aggressive if the "Plus" version is slightly behind the original 16nm and customers wait for the "Plus" version.

Please see other Morgan Stanley reports on this subject:

Global Semiconductors: Chipping Away at Returns

Global Semiconductors: Q3 Spotting, and Why Apple Is Going 64-Bit

TSMC: Altera Going to Intel: TSMC Implications

TSMC: Intel's foundry door opens slightly wider

Intel Corporation: Thoughts on Apple Foundry Opportunity

Comparing TSMC's 16nm to Intel's 14nm: Intel's information likely outdated

When Intel drew the chart comparing gate density, the company was likely comparing published TSMC figures on 16nm to Intel's own data on 14nm. Since then, TSMC has announced a new evolution of the 16nm node, which the company calls 16FinFET Plus. The company stated that the "Plus" technology would provide a 15% performance improvement, which likely implies that customers can also get a density improvement of 15% or slightly more at the same transistor performance. The company also stated that back-end design rules for the 16FinFET Plus will be the same as the original 16nm design.

We believe the difference between Intel's claims at 16nm versus TSMC's is Intel was plotting the original 16nm from TSMC, whereas TSMC's own chart plots the "Plus" version.

Is the 16nm Plus node comparable to Intel's 14nm? Depends. Because 16FinFET Plus is a transistor improvement with the same back end as the original 16nm process (which itself uses the same back end as TSMC's 20nm process), performance likely depends on whether the chip is limited by the front end (transistors) or back end (interconnects). Our guess is for applications that are front-end limited, 16FinFET Plus will be pretty comparable to Intel's 14nm. However, for applications that have bottlenecks at the back end, Intel likely is still ahead since the 16FinFET Plus does not offer a different bac -end. This probably makes sense for both companies:

- Intel's key foundry customer today is Altera, and its products are programmable and thus require very complicated back ends.

- On the other hand, TSMC's initial customers for 16nm are likely in the mobile market, where back end is not as key as front end.

Though we agree with TSMC's claims in general on 16nm, expectations for timing may be too aggressive. 16nm for TSMC is slated for early 2015, a year after 20nm. We do not recall TSMC's management specifically giving timing for 16FinFET Plus, but it is probably fair to assume that it will be slightly later than the original 16nm. This does not change the schedule for customers that want the original 16nm, but for those that decide to wait for the "Plus" version, timing for 16nm may get pushed out by one or two quarters. Our guess is that most of the customers will wait for the "Plus" version instead of the original 16nm, since it's only slightly later and offers better performance. That would imply that TSMC's revenue ramp on 16nm overall could be a bit later than investors expect.

Competitively, it does push TSMC back a few quarters versus Intel, at least on paper. Intel is slated to ramp Altera's 14nm chip in late 2014 or early 2015. TSMC's 16nm was slated for production in early 2015 – a very similar schedule. If customers wait for the "Plus", then in effect TSMC's offering might be behind Intel's. We note, however, that Intel does not have as much experience ramping foundry customers, and thus while this is true on paper, execution is likely a bigger risk on Intel's side than TSMC's.

Comparing 10nm: Too early to say

10nm is likely a couple of years after 16nm for TSMC, and we do not believe there is enough information to compare Intel's 10nm to TSMC's.

At the recent analyst meeting, TSMC's management stated that its current plan for 10nm does not use EUV because EUV's throughput is too slow. Management also said that if EUV does improve, the company will consider slotting it into 10nm. To us, it is pretty clear that the 10nm process/equipment set has not been locked down at this point, given these recent comments. If that is the case, it seems premature to compare density because it is all theoretical at this point. We believe TSMC is stating essentially that its *goal* for 10nm is to be on par with Intel, but for investors, proof is likely a year away.

As we have said in previous reports, our own view is that if EUV is delayed, it would be likely to favor Intel competitively:

1) Intel is likely less cost-sensitive than TSMC and can better absorb the higher costs associated with multiple patterning.

2) Intel has already decided against using EUV for 10nm, whereas for TSMC it is still an option. We would guess that Intel's dedication to using multiple patterning means that it has an edge technically.

Density is only part of the debate

Though investors are focused on the debate on transistor density, our own view is that other factors are equally important, if not more so:

The foundry landscape has changed. Whether TSMC's 16nm/10nm is slightly behind Intel's 14nm/10nm or not, the foundry competitive landscape has changed in that TSMC was always the clear technology leader previously, but now Intel is in the same vicinity as TSMC from a technological perspective. TSMC competitively always offered a premium product: One node ahead of peers, at a big price premium. Now, Intel could offer an ultra premium product if it does execute. The question:

how big is that market? Clearly, it depends both on the pricing premium and to whom Intel wants to open the fab.

We think the fight is more at 10nm than 14nm/16nm. For a fabless customer, going to Intel for 14nm today probably does not make a lot of sense, even if Intel's claims on density are valid. Timing-wise, Intel is not that different from TSMC. A fabless company likely needs to dedicate more resources because Intel lacks the ecosystem that TSMC has developed (IP library, EDA tools, etc.), and there is more risk in Intel's execution. That's a lot of risk for likely a minimal gain on performance/timing.

However, at 10nm, there's still much unknown in terms of execution, and the paths that TSMC and Intel are going down at 10nm could be more different. Given the risks with EUV, it probably does make sense for some of the larger fabless companies to diversify risk and at least look at Intel as an option.

How Intel prices its foundry wafers and who Intel supports will be key. Exhibit 2 looks at Intel's cost structure versus TSMC's. Our view has been that Intel's cost structure is significantly higher than TSMC's, but Intel could forgo profits in the near term to take share. It could also treat depreciation expenses as sunk cost and simply look at what taking on additional foundry business does to cash earnings.

Intel has said in the past that it will not make wafers for competitors. It will be interesting to watch how it defines that.

From Intel's perspective, the significance of the transistor density debate comes back to the core profitability of the business. Few would question that Intel can drive some performance advantages with its advanced process nodes. However, we think that Intel wafers are substantially more expensive than TSMC wafers. That's consistent with the different business objectives of the two companies.

How does Intel's wafer cost compare to TSMC's? As we have published in the past, we think Intel wafers are relatively expensive vs. those from other large-scale logic manufacturers, especially TSMC. Despite the significant efficiencies of its high reuse, copy-exactly methodology when it comes to deploying cutting-edge manufacturing, Intel's exceptionally high revenue per wafer gives it a natural incentive to optimize on raw transistor performance over cost optimization. The process leadership is not free.

Meanwhile, we think TSMC's wafer costs are exceptionally low, because its business model is to some degree optimized around delivering wafers at costs that are competitive with its fab-lite customers' internal fabs, while allowing for high gross margins to TSMC. We have seen company after company outsource manufacturing to TSMC without sacrificing margins, despite TSMCs relatively high profitability. Though TSMC's lower reuse creates higher capital intensity at the leading node, vs. Intel the company's costs are still very low.

Exhibit 2

Intel's 22nm COGS per Wafer Likely Significantly Higher than TSMC at 28nm

Intel COGs per Wafer		
Gross die per wafer		
22nm CPU (quad core)		367
22nm CPU (dual core)		498
Yield assumption		65%
Good die per wafer		
Quad-core		239
Dual-core		324
Average die per wafer		281
Average ASP	$	120
Revenues	$	33,735
Gross Margin		74%
Gross Profit	$	24,964
COGs	$	8,771
Back-end costs	$	1,754
Intel Front End Wafer Cost	**$**	**7,017**
TSMC COGs per Wafer		
Premium Wafer ASP ($'s)	$	6,500
Gross Margin @ 28 nm		40%
Gross Profit ($'s)	$	2,600
TSMC Wafer Cost	**$**	**3,900**
Intel Premium		*1.80x*

Source: Company Data, Morgan Stanley Research

In Exhibit 2, we try to compare Intel's current cost per wafer at 22 nm with TSMC's costs at the leading node (currently 28 nm), with some admittedly uncertain assumptions for INTC yield, which the company does not share. (Note that we do break out Intel's back-end costs per wafer, costs that TSMC does not have).

We suspect we are understating 22 nm revenue per wafer somewhat, given low yield assumptions (65%), so Intel's revenue per wafer and cost per wafer may be significantly higher. Gross margins of 74% on 22 nm seem reasonable, given overall margins averaging just over 60%, with much higher margins on data center products, but some lower margins from non-CPU products. Higher yields, higher ASPs, or lower gross margins would make the comparison less favorable to Intel.

At any rate, with those caveats, the data in Exhibit 1 shows that Intel's cost per wafer at 22 nm is likely about 80% higher than TSMC's costs at 28 nm.

For completion, we show both Ivy Bridge and Haswell numbers. Though the Haswell numbers should show sharp increase in revenue per wafer vs. Ivy Bridge, we think this excess contribution is largely invested into 14 nm startup costs.

Intel has of course not confirmed these numbers, but it agrees with the general statement that CPU wafers are more expensive than the average TSMC wafers.

Intel would argue, however, that TSMCs scaling benefits have stalled, and so while the wafer price may be higher, what the customer ultimately cares about is the price per transistor.

Taking the Intel chart literally, the company is actually at a density disadvantage when comparing its own 22 nm to TSMC's 20 nm. So the company's 50% higher wafer price is potentially compounded by a 20% or so density disadvantage, making it imperative that the company would get premium revenue per wafer.

At 14 nm, the company claims a 35% advantage vs. TSMC's 16 nm – which starts to neutralize (but not eliminate) the cost advantages. However, this comparison was with the original TSMC 16 nm, which was not a shrink at all, and to some degree is taking advantage of the marketing claim that 20 nm Finfet is a shrink to 16 nm. Vs. the TSMC 16 nm plus numbers, the advantage is a bit less clear, as likely transistor density would still be similar.

We have heard some investors suggest a 100% correlation between these transistor densities and cost, which clearly isn't the case – the transistor layer is only a fraction of the overall cost structure, and back end of line costs have different scaling issues unrelated to FINFET.

Our conclusion is that Intel will close the cost gap somewhat at 14 nm, but will remain at a cost premium. Until this changes, profitability of the business will be driven by maintaining a very high mix of cutting-edge process nodes vs. trailing nodes, and potentially getting a price premium for the company's process leadership.

The challenge for Intel remains that the customers who care most about remaining at the absolute cutting edge – AMD, NVIDIA, and Qualcomm – are all competitors to Intel. While we have hard from industry contacts that Intel foundry has approached various customers such as Broadcom, Cypress, and Marvell, but those customers have traditionally had much of their volume at an N-1 process node.

It will also take time. Intel has indicated that the Altera relationship is a fairly good indication of lead time. It will take at least six to nine months to work out the details of a new relationship, and then another couple of years to get to volume. So the window of leadership on 14 nm is not really the primary factor.

Still, Intel remains committed to this business, and customers are enthusiastic. We think that in time, Intel can build a business with a lower wafer cost, with potentially lower costs at n-1, and Intel can build the competencies of a world class foundry. We do expect Intel's presence in foundry to be somewhat disruptive. But in the next five years, we'd be surprised if foundry generates an amount of earnings that is relevant vs. Intel's overall US$12bn in operating income.

Financial Summary

Income Statement, 2012-2015E, Year End Dec

NT$ m	2012	2013E	2014E	2015E
Turnover	**506,249**	**597,024**	**672,247**	**730,464**
YoY Growth	*18.5%*	*17.9%*	*12.6%*	*8.7%*
Gross Profit b/f dep	363,255	423,102	504,856	559,171
Less: COGS	**(262,654)**	**(316,080)**	**(359,801)**	**(381,181)**
Variable costs	(142,994)	(173,923)	(167,391)	(171,294)
Depreciation & amort	(119,660)	(142,157)	(192,409)	(209,888)
Gross profit	**243,595**	**280,945**	**312,446**	**349,283**
% margin	*48.1%*	*47.1%*	*46.5%*	*47.8%*
YoY Growth	*25.5%*	*15.3%*	*11.2%*	*11.8%*
Operating Expenses:	**(62,538)**	**(71,516)**	**(76,498)**	**(79,687)**
R&D	(40,402)	(48,118)	(55,970)	(58,650)
Sales and Marketing	(4,497)	(4,307)	(3,909)	(3,652)
General and Admin	(17,638)	(19,091)	(16,619)	(17,385)
Operating Profit	**181,057**	**209,429**	**235,949**	**269,596**
% margin	*35.8%*	*35.1%*	*35.1%*	*36.9%*
YoY Growth	*27.9%*	*15.7%*	*12.7%*	*14.3%*
Forex gain	582	133	0	0
Interest expense	(1,020)	(2,647)	(3,337)	(3,337)
Interest income	1,645	1,282	1,630	1,669
Net Investment Income	2,029	4,478	3,600	3,600
Other income (expense)	(2,739)	2,811	0	0
Pretax Profit	**181,554**	**215,487**	**237,842**	**271,528**
% margin	*35.9%*	*36.1%*	*35.4%*	*37.2%*
Tax	(15,590)	(27,469)	(31,714)	(36,385)
Net Income bf. emp. bonus	191,083	216,369	237,047	268,064
Employee bonus expense	(24,924)	(28,222)	(30,919)	(32,920)
Reported net Income	**166,159**	**188,147**	**206,128**	**235,143**
Reported EPS (NT$)	**6.41**	**7.26**	**7.95**	**9.07**
ModelWare EPS (NT$)	**6.41**	**7.26**	**7.95**	**9.07**

Key Ratios, 2012-2015E

	2012	2013E	2014E	2015E
Return (%)				
ROAA	19%	17%	16%	16%
ROAE	24%	24%	23%	22%
OP. ATO	1.0x	0.9x	0.9x	1.0x
Gearing (x)				
Net Debt/ Equity	-0.09x	-0.03x	-0.04x	-0.12x
Current Ratio	1.8x	2.3x	2.4x	3.2x
Quick Ratio	1.4x	2.0x	2.1x	2.8x
Operating Cycle				
AR/NR Turnover (days)	33	36	41	42
Inventory Turnover (days)	43	44	43	45
AP Turnover (days)	19	17	16	17
Cash Conversion (days)	57	63	68	70

E = Morgan Stanley Research Estimates
Source: Company Data, Morgan Stanley Research

Balance Sheet, 2012-2015E, Year End Dec

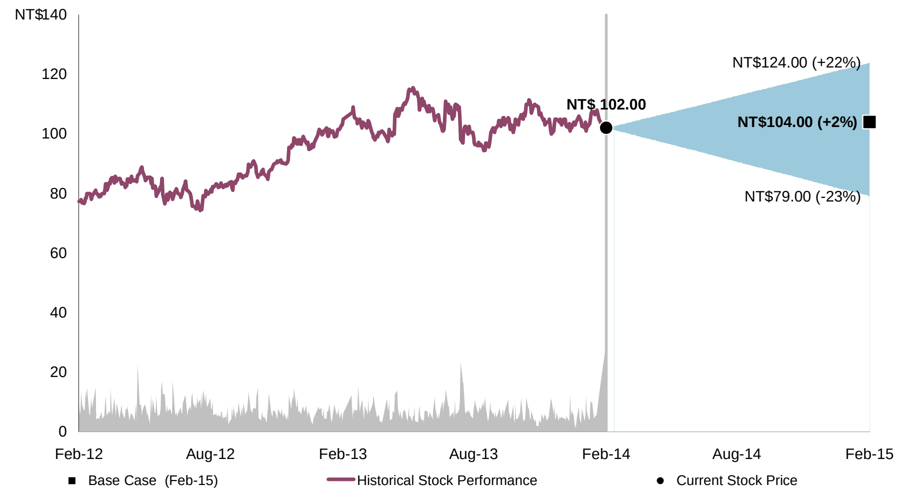
NT$ m	2012	2013E	2014E	2015E
Cash & Equivalent	143,411	235,650	246,363	346,752
MarketableSecurity	7,507	1,561	1,561	1,561
A/R & N/R	52,093	68,208	86,656	84,137
Inventories	37,830	38,829	46,307	49,059
Other Current Ass.	11,447	3,457	3,457	3,457
Total current assets	**252,289**	**347,705**	**384,344**	**484,966**
Long-term Investment	65,786	90,319	93,919	97,519
Total fixed assets	617,529	766,339	861,598	908,466
Total other assets	19,430	22,440	22,440	22,440
Total Assets	**955,035**	**1,226,803**	**1,362,301**	**1,513,391**
A/P & N/P	15,239	14,494	17,286	18,313
Accrued Expenses	30,957	22,664	27,029	19,731
Other Payable	44,832	58,381	58,381	58,381
Curr. of L-T Debt	1,042	0	0	0
Other Curr. Liab.	50,366	57,197	57,197	57,197
Total Current Liab.	**142,436**	**152,737**	**159,893**	**153,622**
L-T Liabilities	82,161	211,215	211,215	211,215
Total Other L-T Liab	4,683	13,866	13,866	13,866
Total Liabilities	**229,281**	**377,818**	**384,974**	**378,703**
Common Stocks	259,244	259,284	259,284	259,284
Preferred Stocks	0	0	0	0
Capital Reserve	56,138	55,842	55,842	55,842
Retained earnings	407,816	533,561	661,904	819,265
Treasury Stock	0	0	0	0
Minority Equity	2,556	298	298	298
Total Equity	**725,754**	**848,985**	**977,327**	**1,134,688**
Total Liab. & Equity	**955,035**	**1,226,803**	**1,362,301**	**1,513,391**

Cash Flow Statement, 2012-2015E, Year End Dec

NT$ m	2012	2013E	2014E	2015E
Net Income Current	165,964	188,147	206,128	235,143
Depreciation	131,349	158,517	213,788	235,829
Net Investment Losses (Gains)	(2,029)	(4,478)	(3,600)	(3,600)
Decrease (Increase) in Working Capital	(20,755)	(26,831)	0	794
Others	14,535	30,412	(18,770)	(7,298)
Cash Flow-Operating	**289,064**	**345,766**	**397,546**	**460,868**
(Purchase) of FA	(246,137)	(295,749)	(309,048)	(282,697)
Sale of Fix Asset	157	97	0	0
(Purchase)L-T Inv.	0	0	0	0
Others	(27,216)	7,556	0	0
Cash Flow-Inv.	**(273,196)**	**(288,096)**	**(309,048)**	**(282,697)**
Inc(Dec)-S-T Debt	8,788	(16,662)	0	0
Inc(Dec) L-T Debt	(2,718)	(2,404)	0	0
Dividend Paid	(77,749)	(77,773)	(77,785)	(77,783)
Dir.&Emp.Bonus	0	0	0	0
Others	57,867	131,370	0	0
Cash Flow-Financing	**(13,811)**	**34,530**	**(77,785)**	**(77,783)**
Change in Cash	**(62)**	**92,239**	**10,713**	**100,389**
Net cash/(debt), b/f	143,472	143,410	235,650	246,363
Net cash/(debt), c/f	**143,410**	**235,650**	**246,363**	**346,752**

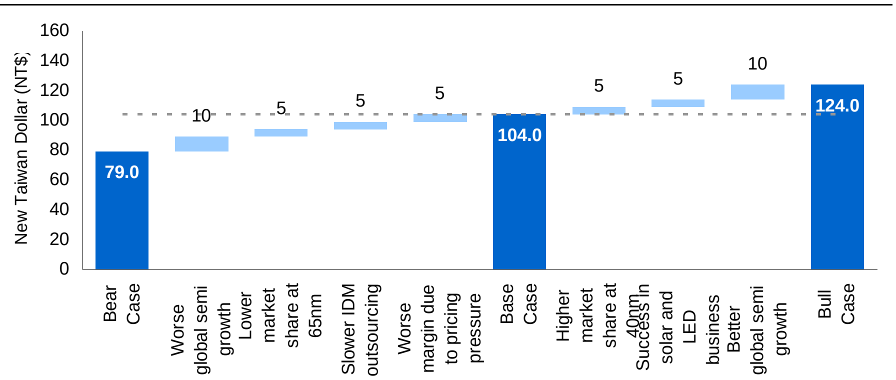
Risk-Reward Snapshot: TSMC (2330.TW, NT$102, EW, PT NT$104)

Risk-Reward remains balanced, and our scenario values are unchanged



Price Target NT$104		Our base case value (NT$104) from our residual income model (WACC of 11.7% and a terminal growth rate of 2.3%).
Bull Case NT$124	15.6x Price to 2014E Earnings	**Upside from 28nm and 20nm:** 1) Global semi revenue growth of more than 10% in 2013 amid strong demand trend for mobile Internet; 2) TSMC maintains market share at 28nm; 3) good progress in 20nm and 16nm FinFET.
Base Case NT$104	13.1x Price to 2014E Earnings	**Sustainable market share:** Our base-case estimates are based on: 1) global semi revenue growth of ~3% in 2013; 2) foundry ASP declines 3-5% per node in 2013; 3) TSMC leads in 28nm geometry with an average 90% market share assumed in 2013.
Bear Case NT$79	9.9x Price to 2014E Earnings	**Tougher macro environment in 2013; severe pricing pressure:** 1) The global economy turns down more than expected in 2013, resulting in flat semi revenue or a slight decline. 2) Declining 28nm market share causes a revenue shortfall. 3) Foundry ASP declines 10% per node in 2013 on intense competition.

From Bear to Bull: Global Semiconductor Growth Is the Key Variable



Source: Thomson Reuters, Morgan Stanley Research estimates

Why Equal-weight

- Smartphones and tablets, the past key drivers for the foundry industry, are mostly played out as catalysts, in our view.
- We see a potentially slower ramp at 20nm and 16nm as costs for extending Moore's Law continue to go up.
- Large capex budget implies TSMC is planning for a very bullish demand outlook in the next few years; we think the risk/reward is not favorable.

Key Value Drivers

- Market share at leading edge and 28nm/20nm geometry.
- Growth of global semi industry, based on ramp of mobile devices, including smartphones and tablets.
- Development in solar and LED businesses.

Potential Catalysts

- New project wins, especially at the leading edge.
- Utilization rate and ASP trends.
- Semiconductor industry demand and inventory levels.
- Any announcement of success in solar and LED businesses.

Downside Risks to Our Price Target

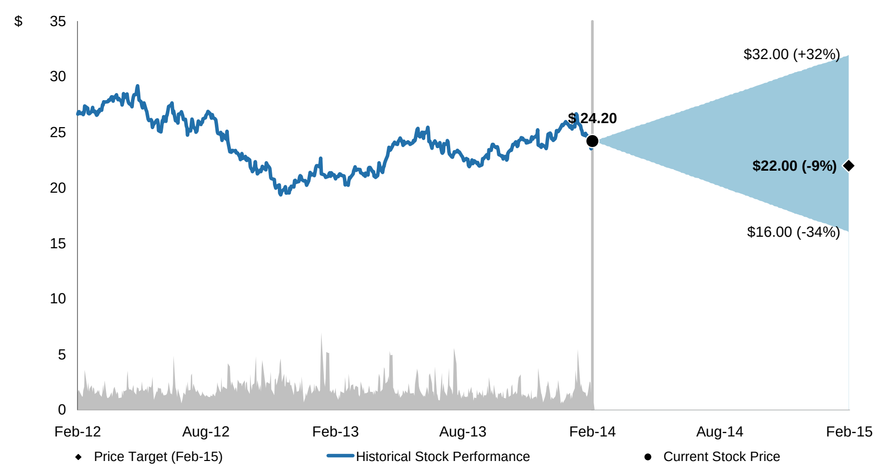
- Slower-than-expected global economy and semiconductor growth.
- Margin and market share decline due to price competition.
- Oversupply of smartphone and tablet PCs.

Upside Risks to Our Price Target

- Better end-demand and faster depletion of semi inventory.
- Market share gain in leading edge.
- Success in solar and LED businesses.

Risk-Reward Snapshot: Intel Corporation (INTC, Underweight, PT $22)

Risk-Reward: Recent Strength Leaves Little Room for Error



Source: Thomson Reuters, Morgan Stanley Research estimates

Price Target: US$22	Equal to Base Case scenario. We value Intel on 11x 2015 EPS, a ~5x discount to the semi universe average given Intel's high exposure to the secularly challenged PC market and lower free cash flows
Bull Case: US$32 12x 2015 EPS of $2.49, plus $1.60 net cash	**PC market returns to growth in 2015, and Intel's success in tablets and foundry drives multiple expansion** • Revenues: 6% revenue CAGR through 2014 • Gross Margins: 63.5% in 2013 • $2.49 in 2014 EPS • 2-in-1 form factor mitigates tablet cannibalization and drives growth • Intel platform ASP ends 2014 at $120, vs. AMD at $50; potentially risking increased competitive vulnerability?
Base Case: US$22 11x 2015 EPS of $1.83 plus $2 net cash; ~20x FCF; ~4% dividend yield support	**Good execution continues but pricing flattens;** we project: • PC Client revenues decline 2% in 2014, grow slightly in 2015 • Servers: ~7% Y/Y growth in 2014 and ~12% in 2015 • Gross margins:slightly below consensus as bottom up shows slight degradation • BayTrail has decent traction at some transitional cost to overall earnings
Bear Case: US$16 10x 2015 EPS of $1.58	**Assumes average selling price declines 5% in 2014 & 15 due to mix shift to Bay Trail notebooks, without offsetting volume; microservers impact investor confidence in servers.** • Revenues decline 1% y/y in 2014 • Return on assets declines from 18% to 12% by year end • Dividend declines or is maintained synthetically • Multiple compression as concern builds about further margin degradation in 2015

Investment Thesis

- While recent strides in mobility are important, it is just difficult to add meaningfully to Intel's $32bn in gross profit with tablets or foundry or other businesses
- Intel's strategy with Bay Trail seems to be to aggressively move down market into sub $399 2 in 1s and sub $199 tablets; lower than expected reception in 4Q due to products (and operating systems) coming too late in the year.
- We expect Depreciation to rise by almost $2 bn from 2013 to 2015 due to elevated capex
- We are reasonably upbeat on prospects in servers, where microserver impact is small through 2014, and feel that eventually manufacturing leadership will lead to new, albeit small, new profit opportunities.
- Dividend yield of 3.4% doesn't protect downside given the stock price appreciation

Catalysts

- Mobile data points from Mobile World Congress (February 2014)
- PC data points post XP expiration end of 2Q

Where We Could be Wrong

- Biggest upside in our view would come if PCs start to grow; could indicate tablet fatigue.

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(as of January 31, 2014)

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Equal-weight/Hold	**1315**	**44%**	**392**	**48%**	**30%**
Not-Rated/Hold	**101**	**3%**	**26**	**3%**	**26%**
Underweight/Sell	**543**	**18%**	**96**	**12%**	**18%**
Total	**2,973**		**825**		

Data include common stock and ADRs currently assigned ratings. Investment Banking Clients are companies from whom Morgan Stanley received investment banking compensation in the last 12 months.

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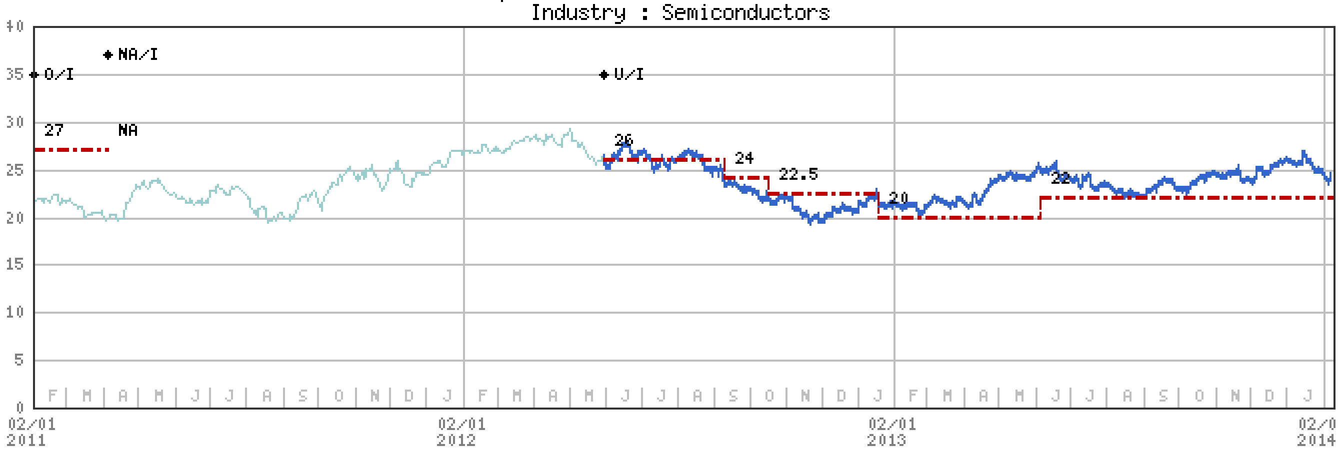
Stock Price, Price Target and Rating History (See Rating Definitions)

Intel Corporation (INTC.O) - As of 2/8/14 in USD
Industry : Semiconductors



Stock Rating History: 2/1/11 : O/I; 4/5/11 : NA/I; 5/30/12 : U/I

Price Target History: 1/10/11 : 27; 4/5/11 : NA; 5/30/12 : 26; 9/10/12 : 24; 10/17/12 : 22.5; 1/18/13 : 20; 6/5/13 : 22

Source: Morgan Stanley Research   Date Format : MM/DD/YY   Price Target   No Price Target Assigned (NA)
Stock Price (Not Covered by Current Analyst)   Stock Price (Covered by Current Analyst)
Stock and Industry Ratings (abbreviations below) appear as ◆ Stock Rating/Industry View
Stock Ratings: Overweight (O) Equal-weight (E) Underweight (U) Not-Rated (NR) No Rating Available (NA)
Industry View: Attractive (A) In-line (I) Cautious (C) No Rating (NR)

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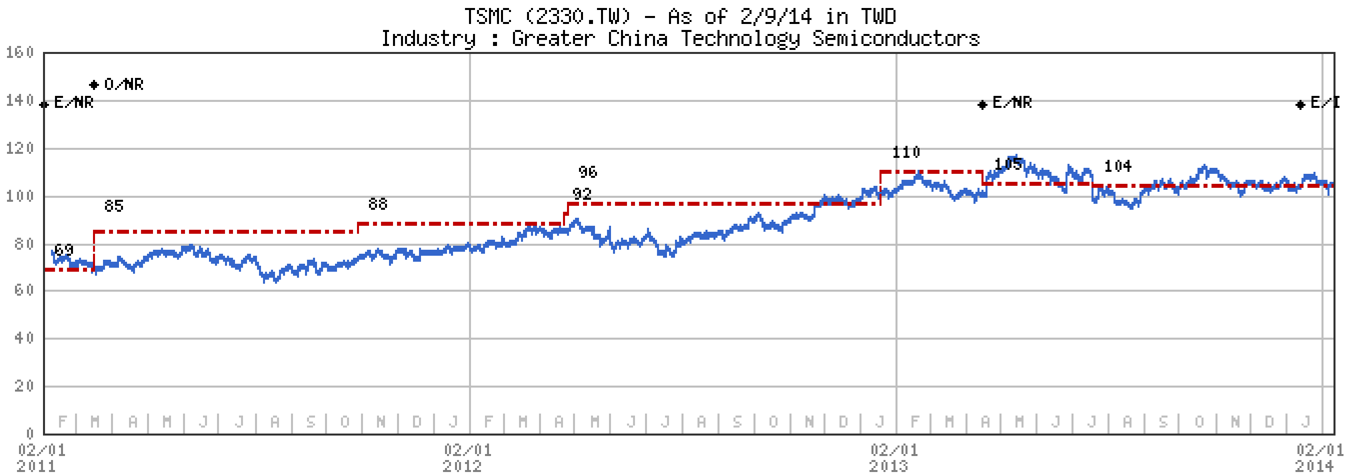

Stock Rating History: 2/1/11 : E/NR; 3/16/11 : O/NR; 4/15/13 : E/NR; 1/13/14 : E/I

Price Target History: 1/28/11 : 69; 3/16/11 : 85; 10/28/11 : 88; 4/21/12 : 92; 4/26/12 : 96; 1/18/13 : 110; 4/15/13 : 105; 7/18/13 : 104

Source: Morgan Stanley Research Date Format : MM/DD/YY Price Target No Price Target Assigned (NA)
Stock Price (Not Covered by Current Analyst) Stock Price (Covered by Current Analyst)
Stock and Industry Ratings (abbreviations below) appear as ◆ Stock Rating/Industry View
Stock Ratings: Overweight (O) Equal-weight (E) Underweight (U) Not-Rated (NR) No Rating Available (NA)
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Industry Coverage:IC Manufacturing

Company (Ticker)	Rating (as of)	Price* (02/07/2014)
Charlie Chan		
Chipbond Technology Corp (6147.TWO)	O (07/22/2013)	NT$50.8
Powertech Technology (6239.TW)	E (11/07/2013)	NT$41.6
Bill Lu		
Advanced Semi Engineering (2311.TW)	E (07/18/2012)	NT$28.4
SMIC (0981.HK)	O (06/24/2013)	HK$.8
Siliconware Precision Industries Co. (2325.TW)	E (09/23/2011)	NT$36.3
TSMC (2330.TW)	E (04/15/2013)	NT$104
UMC (2303.TW)	O (06/24/2013)	NT$12.1

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